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ABSTRACT

The Texas Interactive Instructional Network (TI-IN), a private satellite system that provides one-way video and two-way audio communication, was used for a two-year pilot project which was conducted to determine if satellite instruction could be used successfully to share educational resources among institutions. Models of Teaching, a graduate course in education, was offered by Texas Tech University, and another graduate course was offered by the University of Houston, Clear Lake. This two-part report presents both a description of the process used at Texas Tech University and experiences from which lessons were learned while teaching the course, and the results of a survey of the 31 students who completed the course. Topics covered in the first section include the facilities and equipment used; planning for the course; characteristics of the students who enrolled in the course; the course content; the teaching methods used; and the challenges encountered and how they were met. In the spring of 1987, the 31 students who completed the course were sent a 36-item questionnaire designed to assess their opinions of the experience and how it could have been improved. Detailed analyses of the data from the 26 usable responses received and suggestions and observations for others contemplating teaching via satellite conclude this section of the report. Two tables displaying survey data are appended and three references are listed. (RP)

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TEXAS TECH UNIVERSITY'S "MODELS OF TEACHING" OVER SATELLITE: A DESCRIPTION AND EVALUATION OF COLLEGE CREDIT COURSEWORK DELIVERED VIA THE TI-IN INTERACTIVE SATELLITE NETWORK

A Report Submitted to the Office
of the Academic Vice President
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TEXAS TECH UNIVERSITY'S "MODELS OF TEACHING" OVER SATELLITE: A DESCRIPTION AND EVALUATION OF COLLEGE CREDIT COURSEWORK DELIVERED VIA THE TI-IN INTERACTIVE SATELLITE NETWORK

Starting in the Fall of 1985, the Texas Interactive Instructional Network -- better known as TI-IN -- began broadcasting high school credit courses to subscribing high schools in Texas and California. In so doing, TI-IN became the first private satellite netwcrk in the United States to offer high school credit coursework via the medium of satellite instruction. The system is fully interactive with one-way video and audio transmissions originating from studios in San Antonio and uplinked to a KU-band 72 MHz transponder on the Spacenet II satellite. Along with a TV monitor and special telecommunications equipment at each receive site, the system includes cordless telephones which are programmed to automatically dial a toll-free number in the studio where the "satellite teacher" is teaching. The result is one-way video and two-way audio communication, thereby allowing for live teacher/student interaction. With this advanced technology, it is feasible for a master teacher to teach a course that is simultaneously beamed by satellite to multiple sites virtually anywhere on the North American continent.

The potential for satellite communications to reach vast audiences of students at a relatively low per pupil expenditure

has captured the interest of many college and universities. In July of 1986, administrators of the Texas College and University System Coordinating Board authorized a two-year pilot project, with Dr. Nil Whittington as chair to consider the use of TI-IN as a delivery mechanism for college credit coursework (Ashworth, 1986). The intent was to determine if satellite instruction could be used successfully to share educational resources among institutions and to provide access to educational resources not available to some areas of the state. Accordingly, institutions of higher education across the state of Texas were invited to participate with TI-IN in offering college credit coursework. Texas Tech University and the University of Houston, Clear Lake offered the first two college credit courses over satellite. Funding for Texas Tech's participation in the project was provided by a $15,000 grant to the College of Education. A $10,000 gift was offered from the Dodge-Jones Foundation and $5,000 was offered from the May Baker Ramsey - Hemphill Wells Foundation.

The purpose of this report is (1) to describe the process we encountered and the experiences from which we learned while teaching college credit coursework over satellite, and (2) to present research findings provided from students who participated in the project. This report is divided into two sections. Section One is a personal narrative, written by Dr. Marvin

Platten, of our involvement in the program, problems and challenges we encountered and what we learned from teaching via satellite. Section two, written by Dr. Bruce Barker, is a compilation of student responses to a survey conducted at the end of their 13 week experience in learning by satellite.

Section One

Introduction

EDSE 5335 Models of Teaching, a graduate course in education, was taught by the College of Education and broadcast on the TI-IN Network during the Fall Semester of 1986. This and another graduate course (taught by the University of Houston at Clear Lake as stated above) were the first two college courses taught via the TI-IN Network. This offered to us an unusual opportunity to be one of the forerunners of an innovative way of delivering a course via satellite to various sites in Texas. It also represented real challenge inasmuch as the success of this particular course depends largely on a high degree of instructor/student verbal and nonverbal exchanges while the various models are presented, demonstrated, discussed and applied. We planned, therefore, to use the interactive features of the TI-IN television/telephone in an attempt to foster interaction between faculty and students albeit more vicarious in nature.

The Facility

The unique feature of TI-IN "live" programs is that the viewer and the instructor can interact with one another during the program no matter where the viewer's receive site is located. This interaction is made possible by a telephone system that

enables the viewer to make calls directly to the studio during the program. Because the incoming calls are amplified in the studio, they are picked up on the telecast and beamed out to all the sites so that the viewers could not only hear the caller's voice but could also see as well as hear the instructor's response at their individual sites.

The studio we used reminded us of a "disk jockey" setup in that one person (the instructor) operated all the equipment. This rather small studio is equipped with three TV cameras all of which are operated by the instructor from a console located on the lectern (none of the cameras are operated by a camera man). One camera is mounted on a wall and is focused on the instructor who is seated at the lectern/console counter. Another camera is mounted above and to the right of the lectern and is used to project a view of opaque materials lying flat on a stage such as a blue lined writing pad (which substitutes as a chalkboard), an open textbook, charts, etc... Transparent materials can also be projected with this camera in that overhead and slide projectors are built into the equipment. A third camera is used to telecast videocassette tapes. The instructor must also operate a control panel to the left of the lectern. The panel includes incoming telephone calls, microphone and VCR controls and the like. A character generator is also available for superimposing printed

matter on the TV screen. A television monitor is mounted just below the first camera to show the instructor what is being broadcast. In addition, three small monitors are located near the console, one for each of the cameras. These help the instructor prepare camera shots of material that is to be telecast next in the program.

The TI-IN Network gave us an orientation to the studio as well as some time to practice using the equipment. But we most certainly realized how much we needed to learn about the technical aspects of telecasting a satellite graduate college course. This would be one of the greatest challenges for us in planning for the delivery of EDSE 5335 on TI-IN.

Planning for the TI-IN College Course

As we entered into the planning of the satellite instruction course we soon found that the success of the venture would largely depend on a concerted teaching team effort among selected College of Education faculty. To begin with, the idea for broadcasting a course from Texas Tech on the TI-IN Network originated with Dr. Bruce Barker (co-author of this paper), College of Education. He also wrote the initial grant proposal, a version of which has funded the extensive travel that was required to conduct the course at the Education Service Center (Region Twenty) in San Antonio. Enrollment procedures,

collection of fees, grade reporting to other institutions and the like was coordinated by Dr. Michael Mezack, Director of the Division of Continuing Education. Other team members, beyond the College of Education, provided valuable service. Their contributions are documented at the end of our report. Inasmuch as the instructor of record for the course to be taught via TI-IN by Texas Tech University was myself, Dr. Marvin Platten, I was chosen to be the coordinator of instruction as well as the primary instructor for this venture. Because we had such a late start in preparing for the satellite course, one of our first and most urgent duties was to expedite the purchase of textbooks. To complicate matters, we had no idea of how many textbooks to order. Enrollment in this course was "unlimited"; we could expect anywhere from ten to 100 or more students to register. Ordering from bookstores didn't look too promising. The Texas Tech Bookstore was concerned about the surplus of texts in the event enrollment was minimal. Furthermore, texts would not be available for purchase for quite some time. We decided therefore, to request that students call the publisher directly to order texts rather than to use the usual procedure of purchasing them through bookstores. We reasoned that they would be able to get their books much sooner by ordering them directly. Little did we know that the text, Models of Teaching (Joyce &

Weil, 1986), was temporarily out of stock; it would take another three to four weeks for the publisher (Prentice Hall) to make this edition available for purchase. Although quite a few were able to obtain the required texts from local bookstores, many students were without one for as much as five weeks into the course.

Another related dilemma was the determination of course requirements. None of us relished the idea of grading hundreds of term papers and examinations if enrollment were high. On the other hand, not requiring at least some written work in addition to objective examinations would not adequately evaluate the students' learning in the course. There were other problems. For example, many students probably would not have ready access to graduate university libraries to do research and the like. Therefore, the syllabus that we developed for the TI-IN course had to be rather general, at least until we determined how many students had registered for the course and where the various sites would be located. As it turned out, it wasn't until after the first broadcast session of the course that we had some idea of how many students signed up for the course.

The Students

Thirty-four students orginally registered for the TI-IN EDSE 5335 course and attended class at thirteen different sites. The

largest number of students at any one site was seven: one site had five students, two had four students, one had three students, two sites had two students each and there was only one student in each of six other sites. Many of the sites were a considerable distance from the nearest graduate university (see Section Two). Twenty-five of the students were currently public school teachers with about an equal number teaching at the elementary, middle and high school levels. The high school and middle school teachers taught a variety of subjects including the sciences, mathematics, social studies, reading, music and art. The remaining nine students were either full time graduate students, administrators seeking a certificate or, as in the case of one student, a business college instructor.

In addition to the students at each site, there also was a person assigned by the TI-IN Network to be a classroom "facilitator". His/her duty was what the title implied: to facilitate in conducting the course by seeing to it that all equipment was functioning properly and to distribute and collect exams and other materials sent by the TI-IN Network or by the instructor.

Of the original thirty-four students who enrolled, thirty-one completed the course. Two students took an incomplete due to personal reasons and one student dropped the course. Grading for

the course was somewhat more lenient than for the on-campus version due to the textbook problem as well as the fact that many sites experienced reception and communication problems (Section two will cover this in more detail). The majority of students received an A; most of the remaining received B's and C's. One student failed the course.

The Course Content

Of the twenty models of teaching described by Joyce and Weil (1986) in their book Models of Teaching which was the text for the course, fifteen models were selected and used in the course. The models were chosen for their usefullness and general effectiveness in a variety of situations including different subjects taught in schools and various age levels. The models are grouped in four "families" each of which serve more specific needs and goals. These families together with the individual models we taught are as follows:

(1) Models designed to teach students how to process information: Concept Attainment, Inductive Thinking, Inquiry Training, Advance Organizer and Memory; (2) those that encourage personal development and creativity: Awareness Training, Classroom Meeting, Synectics; (3) those that emphasize social interaction: Role Playing, Group Investigation, Jurisprudential Inquiry, Social Science Inquiry; and (4) behavioral models of

teaching; Simulation, Mastery Learning and Assertiveness Training.

In addition, two other models that were developed by myself were presented: the Shared Concept and Nature Walk Models.

Method of Teaching the Course

We taught the course over the TI-IN Network satellite on thirteen Thursday evenings from 5:30 to 8:45 p.m.. A total of seven professors were involved in one way or another in conducting this course. Of the thirteen sessions, I taught nine, Dr. Gerald Skoog taught two sessions, one of which was with Dr. Arlin Peterson. Also, one session was conducted by Dr. Alice Denham and one was taught by Dr. Duane Christian. In addition, videocassette tapes were made in campus classrooms of professors teaching particular models of teaching to education students for use during some of the broadcasts. Drs. Shamus Mehaffie, Gene Rooze, Alice Denham, Duane Christian, Gerald Skoog and I had tapes made of our teaching. We found that the tapes were highly valuable in demonstrating how the models can be employed in lessons involving a number of different subjects, i.e., poetry, art, social studies and the like inasmuch as the rather compact studio in which we made the broadcasts did not allow "live" students to participate.

We planned each session to focus on one or several of the models

of teaching. At the beginning of each session, we took care of routine matters such as problems with text books, or problems using the telephone system and the like, followed by a preview of the entire lesson. The session was split into three fifty-five minute periods with two ten-minute breaks between. We tried to use the last ten minutes for closure, answering questions about assignments, etc.

The Challenges and How We Coped with Them

As alluded to earlier, the principal challenge to us in this satellite course was to create a "classroom" atmosphere in which the students felt free to ask questions, contribute their own thoughts and ideas and to interact with each other as well as with the professor. A second challenge was to prepare clear, well organized and interesting lessons because those presented on TV must flow much more smoothly that those given in the classroom. "Dead-air" time must be kept at a minimum.

A third challenge for us was to learn how to operate the broadcast equipment sufficiently so that we could use the interactive features of the TI-IN television/telephone system as well as the audio/visual facilities effectively.

To meet the first challenge, we tried a number of approaches. One was to simply ask questions and have students respond. However, it would generally take from two to four minutes for a

respondent to gain access to the studio. This delay was quite disconcerting at times because we had to "fill in" with other material while waiting for a call resulting in some disorientation. Also, many students were reluctant to call for a number of reasons. One reason was that a different type of delay was quite disturbing to some. A caller would hear his/her own voice a split second later on the monitor because the voice signal is beamed up to a satellite and then to the down link receiving sites causing an echo effect. Later, we learned to have a particular site come "on line" before we asked a question. This was much like a teacher calling on a student in class to respond to a question about to be given. If the student does not know the answer, there usually are a number of others quite willing to respond. The system did not allow for this luxury for only one site could call at a time. We found the best procedure was to employ this strategy with sites having more than one student. The larger the group, the better the interaction. One student became the "spokesperson" for the entire group. Yet much of the spontaneity that a "live" class offers was missing. Moreover, this tactic left the six one-person-sites "out in the cold" so we couldn't use it all the time.

Another tactic we employed to improve interaction was to give each site a problem to solve or a topic to discuss and have them

report their findings later in the session. Again this worked better with the larger groups. We considered having the facilitator at each site act as a discussion leader but discovered that that was not one of their prescribed duties.

We eventually found that the type of interaction we had envisioned was beyond the system's capabilities (or the system was beyond our capabilities), therefore an occasional call from a site was all we could realistically expect.

However, at least one form of interaction was acheived. The students were given an assignment to make a videocassette tape of teaching a lesson that employed one of the models of teaching they had studied, either in an actual public school class or to fellow students at their site. After the tapes were sent to us for grading purposes, we showed excerpts of most of them on the TI-IN Network during the last session after their final examination. Students at one site were therefore able to view how students at the other sites applied the models in classroom or peer teaching instruction.

It didn't take us long to realize that lessons given on TV must be far better organized than those given in the classroom. Reports received from the various sites, particularly from the one at Texas Tech emphasized this need (Jim Merchant, who was the facilitator at Tech, submitted valuable reactions and evaluations

of each lesson). Most troublesome for us was the inability to make eye contact with students; we had only a camera lens to relate to. Therefore, we had difficulty knowing if we were moving too fast or slow, or how well we got a point across to the students or if we were making any kind of impact at all on the audiences. As teachers, we thrive on immediate feedback; it gives us a myrid of information as to what kinds of teaching strategies will best work in certain situations. To complicate matters, the course we offered, "Models of Teaching" is best taught through demonstration, discussion and application. We, therefore, had to make some marked adjustments not the least of which was to become "super organized." This meant stating lesson goals clearly, sticking to the topic, recapping salient points and the like. Also, we found that well designed visuals, high contrast slides, and the previously cited videocassette tapes were most valuable in making presentations more meaningful and interesting.

The third challenge, to learn how to operate the broadcasting equipment, was especially frustrating due to our unfamiliarity with the technology of the TI-IN Network. Although orientation and a practice sessions were provided by the TI-IN Network as well as the experience gained using the equipment, we never achieved a level of mastery that would enable

smooth-flowing presentations. If our presentations were made using straight forward lecture, this of course, would not be as much of a problem. However, in our desire to make lessons more meaningful for students, we simply had to become more familiar with the equipment. This was a continuous struggle because we were naturally more concerned with presenting the content than on learning how to use the equipment. Thus, microphones were not always turned on, telephone controls were sometimes not adjusted properly, videocassette tape controls were occassionally incorrectly adjusted, visuals were not always properly placed, a wrong camera was quite often switched to, and so on. Some problems were beyond our control: inclement weather at times interfered with the TV signals at the sites and videocassette tape became jammed occasionally.

This is not to say that TI-IN personnel did not assist us in attempting to produce smooth-flowing programs. On the contrary, they were most helpful, particularily those in "master control" (where all technical aspects of programs are monitored) who continually provided us with valuable assistance and encouragement. Largely, as a result of their assistance, our programs did indeed get better as we gradually gained more confidence in using the equipment.

In conclusion, to teach a lesson for three hours from a fixed

position to an unseen audience using unfamiliar equipment was one of the most challenging experiences I, as instructor of record, have personally ever encountered. Somehow, as the British would say, "We muddled through." And I have to admit, now that it is over, I realize now that I thoroughly enjoyed every minute of it!

Section Two

The satellite broadcast of our graduate level "Models of Teaching" course sparked much interest among other faculty and students. At the conclusion of the course, we deemed it important to assess from those students who had participated in the project their opinions about the experience and how it could have been improved.

Study Procedures

During the Spring of 1987, a 36 item self-administered questionnaire was developed and copies were mailed to each of the 31 students who completed requirements for the course. Usable responses were received from 26 students (83.9 percent return).

The Statistical Analysis System (SAS) computer program for the social sciences was used to list the frequency distributions; and to calculate the mean, standard deviation, and range for each of the variables taken from the questionnaire.

Study Results

Highlights of research findings included the following:

1. Most students who enrolled in the course were practicing teachers (79.2 percent). The others were either full-time college students (16.7 percent) or school administrators (4.1 percent).

2. Motivation for students to enroll in the course was

chiefly to complete college credit to apply toward a graduate degree (42.3 percent), followed by college credit that would apply toward the Texas education career ladder (30.8 percent). The remaining students (26.9 percent) enrolled in the course for personal enrichment.

3. Students enrolled for coursework at the various downlink sites resided an average of 20.4 miles (one-way distance) from the school where they received the TI-IN signal. The range ran from a distance of less than one mile for one student to 65 miles for two students. In addition, most students lived a considerable distance from the nearest graduate university. The mean one-way distance was 54.5 miles with a range of three miles to 125, and a standard deviation of 30.1 miles.

4. Most students (53.8 percent) felt that televised instruction via satellite maintained their interest as well as regular classroom instruction. However, 38.4 percent indicated that it was less interesting, while only 7.6 percent stated that it was more interesting. Similiarly, most students (56.0 percent) reported that they prefered regular classroom instruction over televised satellite learning. Nevertheless, 69.2 percent of the students indicated that if additional college credit courses were offered by Texas Tech University via satellite, they would be interested in enrolling for them. This

was particularly true of graduate level courses.

5. In comparing the level of difficulty in learning by televised satellite instruction to regular classroom instruction, 46.2 percent of the students felt it was "somewhat harder," while 23.1 percent said it was "the same" and another 23.1 percent said it was "somewhat easier." The bulk of students (73.1 percent) reported homework assignments to be "the same" yet only 53.8 percent said exams were "the same." (See Table 1).

Insert Table 1 about here

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6. The frequency of student initiated telephone calls from the receive site classroom to their professor at the studio was considerably low for a graduate level course. The average was only 6.5 calls from each site during the entire course during which 13 live broadcasts of approximately three hours each were aired. Four students (15.4 percent) reported over 20 student initiated calls during the course. Yet 19 students (73.1 percent) reported less than six self-initiated calls or interactive contact with their instructor during the entire course. One explanation for rather low levels of teacher/student interaction may be due to weather interference (on the KU band downlink) or equipment malfunctions. Only 53.8 percent of the

students reported that they received all 13 broadcasts. An alarming 46.2 percent of the students stated that they had missed at least one broadcast. And 27 percent missed two or more broadcasts.

7. Numerous opinion questions were asked of students on a five point Likert type scale. Of interest, the vast majority of students (96.8 percent) agreed that lesson objectives had been well presented by their TV professor, yet considerably fewer students (30.7 percent) felt that the lesson presentations seemed more organized via TV than if they had been given in a regular class. A similar number of students (30.8 percent) indicated that it was easier to let their "mind wander" in the satellite class than it would have been during regular classroom instruction. Most (80.8 percent) agreed that the TV picture was usually clear and easy to see, while 65.4 percent felt that visual aids used by the professor were legible when shown on the TV. A smaller percentage (57.7) agreed that the professor's voice was crisp and easy to understand over-the-air. Even fewer students (46.1 percent) agreed that it was easy to hear other students over-the-air when they telephoned the studio to ask questions. Less than half the students (36.0 percent) reported that their eyes tired while watching TV and most (88.5 percent) reported that sufficient rest breaks were provided during each

satellite broadcast. The majority of students (96.0 percent) felt that homework assignments had been promptly graded and returned by their professor via the mail. Interestingly, a sizeable number of students (60 percent) indicated that there were many times during the lesson broadcasts that they wanted to telephone and ask questions of the instructor, but did not because the call-in procedure was too slow and inefficient. When telephone calls were made to the studio, a sizeable number of students (42.3 percent) expressed concern about "talk-back" noise or audio interference when speaking with the instructor. Furthermore, only 36.0 percent of the students felt that an opportunity for class discussion with students at other receive sites was provided. Finally, 69.3 percent indicated that studying by satellite had been a meaningful learning experience for them, and 65.4 percent reported that their satellite professor had made them feel needed and important in the course -- even though they never met him personally, only becoming acquainted "over-the-air." (See Table 2).

Insert Table 2 about here

When asked what they liked most about satellite instruction, the unanimous response from students was the convenience of

taking a graduate level college course close to their home. Teaching over TI-IN made graduate study more accessible to students who might not otherwise have enrolled because of long distance commuting for 13 class sessions to a graduate university. Of the students enrolled, only 42 percent were pursuing a graduate degree. Many of the others took the course for personal enrichment.

Undoubtedly the biggest weakness reported by students was the limited interaction with their instructor and students at other sites. Student written comments included, "I felt the instruction was not very personal; I didn't feel like I could ask questions; The inability to ask immediate questions limited my phoning the studio; There was a lack of spontaneity; It was difficult to communicate with the instructor and with other sites; The phone did not always work." Another concern voiced by students was that feedback noise was often present when talking with the TV instructor over the telephone. And, for some students it was often difficult to maintain interest in the lesson while watching it over TV.

The major suggestion offered by students on how satellite instruction could be improved revolved around the telephone call-in system. Several students reported that they would have to dial several times to get through to the studio and often were

unable to make contact during an entire broadcast. Other suggestions included the need for more frequent breaks during the broadcast, increased variety in teaching style used by the professor, and opportunity to discuss content with students at other sites. Concerning the need for more breaks, it was mentioned that students who watch TV are also used to a commercial (break) about every 15 minutes.

Conclusions and Recommendations

From its beginning, great interest has been shown in TI-IN. The network has since grown significantly. At the time of this writing, TI-IN was uplinking over 100 hours per week of live programming from its Texas studios to over 200 downlink locations scattered across 14 different states. Program offerings include over 20 different high school credit courses, extensive inservice training and staff development programs, an array of non-credit or student enrichment viewing, and selected college credit courses. The Network is growing so rapidly that plans are underway to establish two new uplink sites beginning in the Fall of 1987 (Barker, 1987).

As a pioneer in delivering college credit coursework via TI-IN, what have we learned and what conclusions can we draw from the experience? Based on the student survey, it is obvious that satellite instruction broadens educational opportunities.

Students no longer need to live in close proximity to a major university in order to complete graduate level coursework. Although no empirical comparisons have been made with students in a traditional setting, the students in our "Models of Teaching" course seemed to perform as well on written assignments, videotaping activities, and the final examination as have traditional students in the past. Nevertheless, we are not prepared to declare that satellite instruction is as effective as regular classroom teaching. Student responses on the questionnaire universally expressed concern about limited interaction with the instructor, problems in dealing with the call-in procedure, and lack of interaction with students at other sites, let alone the fact that almost one-half of the sites -- for various reasons -- missed at least one entire broadcast. Inability of the instructor to maintain visual contact with his/her students also severely limits the opportunity for give and take communication which is so necessary for effective teaching/learning to occur. We conclude that there is no question that teaching via the medium of satellite is a viable alternative for reaching out to students who are geographically isolated from a major college campus. This approach is much better than more well known alternatives of the past and present such as correspondence study, one-way only TV courses, newspaper

courses, etc. It is not, however, a substitute for traditional classroom instruction. This is not to criticize satellite courses, only to state that what still works best is a qualified, well prepared teacher in the classroom.

From having taught a course via satellite, we offer these suggestions and observations to others who may follow in our footsteps.

1. Participation in this activity allowed us to explore new methods of teaching and provided renewed stimulation in teaching a subject which had become somewhat routine.

2. Instructions must be highly organized, pre-planned, and professionally delivered. Each section of content, be it a lecture or a series of lectures, should have clearly defined goals which are communicated to the students. Homework and tests should be directly related to these stated goals. Also, visual information to support the lectures must be content correct, neatly prepared, and visually legible for transmission over TV. Ideally, graphics used for instruction should be professionally prepared.

3. Because the system permits only one-way video, the professor must be particularly sensitive to students which s/he cannot see. Also, the professor is "teaching" to a camera. Techniques such as pausing, clear voice articulation, direct eye

contact with the camera, etc. need to be intentionally incorporated into each lesson. Direct questions to students at the receive sites will also need to be a regular part of instruction. In addition, the TV camera will exaggerate any movement made by the professor. TV teachers need to be self-conscious so as to avoid constantly adjusting their tie, stroking their hair, etc.

4. A conversational and relaxed tone is the best voice communication over TV. The key to good voice communication is pacing. Talkng too fast (due possibly to nervousness) may reduce the clarity of the presentation. In the same respect, slow speech will bore the students.

Final Comments

The opportunity to experience teaching and administering a course via satellite was an exciting venture, particularly for those of us in the College of Education who worked directly with the project. In addition, many others were involved, and their help was invaluable. Other members of the team who made significant contributions to our success included Dr. Don Haragan, Vice President of Academic Affairs, who over saw the entire project and administered the budget. Dr. Michael Mezack, Director of Continuing Education, in addition to coordinating matters between TI-IN, the Coordinating Board, other institutions providing parallel courses, and the TTU College of Education, also provided media and production services from KTXT-TV and over $8,400 in equipment contributions. Dr. John Anderson, Director of Development, worked directly with the Dodge-Jones Foundation to obtain their $10,000 grant to the project and Dr. Don Haragan who worked with the May Baker Ramsey - Hemphill Wells Foundation for their $5,000 donation. And Mr. Jim Merchant, a graduate student in the College of Education who served as a classroom facilitator at the TTU downlink site and chronicled suggestions for improving the instructional delivery over satellite.

Dr. Nil Whittington provided leadership from the Texas College and University System Coordinating Board, expressing

strong support for our involvement. Finally, administrators and staff from the TI-IN Network provided assistance that was vital to our success.

In short, this was an exciting and beneficial experience. The planning and execution of the project required cooperation from the Coordinating Board, the 13 senior colleges and universities in Texas providing parallel credit for "our" course, KTXT-TV, the University Development Office, the TTU College of Education and Division of Continuing Education, and the TTU administration. During the planning and execution of the project a total of five formal meetings were held among selected team members. Two were held in Austin, two at facilities operated by the TI-IN Network, and one at the University of Houston - Clear Lake. We are indebted to all team players for their support and cooperation. Hopefully, the opportunity to directly participate in satellite instruction will present itself again. When it does, we most definately want to be involved on the "cutting edge of teaching from outer-space."

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APPENDIX

TABLE 1

ATTITUDES OF STUDENTS COMPARING DIFFICULTY OF LEARNING VIA TELEVISED SATELLITE INSTRUCTION COMPARED TO REGULAR CLASSROOM INSTRUCTION. REPORTED BY PERCENT; N = 26.

Statement	much harder	somewhat harder	the same	somewhat easier	much easier
Studying by satellite was ...	7.7	46.2	23.1	23.1	0
Assignments given in the satellite class were ...	3.8	3.8	73.1	15.4	3.8
Exams given in the satellite class were ...	3.8	34.6	53.8	7.7	0

TABLE 2

ATTITUTED OF STUDENTS STUDYING BY SATELLITE, RATED ON A SCALE OF "1" TO "5" WHERE "1" REPRESENTS "STRONGLY DISAGREE" AND "5" REPRESENTS "STRONGLY AGREE." REPORTED BY PERCENT; N = 26.

Statement	Strongly Disagree 1	2	3	4	Strongly Agree 5
The TV teacher outlined the objectives in this satellite course	0	0	3.8	3.8	57.7
Lessons over satellite seemed more organized than regular classes	3.8	26.9	38.5	19.2	11.5
I found it easy to let my "mind wander" and not pay attention in my satellite class more than in a regular class	7.7	23.1	11.5	30.8	26.9
The TV picture in class was usually clear and easy to see	7.7	3.8	7.7	46.2	34.5
The audio quality of the teacher's voice on TV was usually clear and easy to understand	7.7	23.1	11.5	23.1	34.6
Visual aids (charts, written notes, pictures, etc.) used by my TV teacher were usually legible and easy to see	3.8	11.5	19.2	26.9	38.5

TABLE 2 (continued)

Statement	Strongly Disagree 1	2	3	4	Strongly Agree 5
When students at other sites called on the telephone, I could easily hear and understand their voices over the TV	3.8	19.2	30.8	26.9	19.2
Learning modules for the course have been promptly graded and returned to me via the mail	0	4.0	4.0	36.0	56.0
The TV teacher made me feel needed and important in this class	0	7.7	26.0	38.5	26.9
My eyes got very tired watching TV during the satellite broadcast.	16.0	32.0	16.0	28.0	8.0
Sufficient breaks (opportunity to go to rest room, get a coke, etc.) were allowed during each three hour satellite broadcast	0	0	11.5	26.9	61.5
Opportunity for discussion of class topics with students at other sites was provided	8.0	12.0	44.0	28.0	8.0

TABLE 2 (continued)

Statement	Strongly Disagree 1	2	3	4	Strongly Agree 5
During the lesson broadcasts, there were many times I wanted to telephone and ask questions, but did not because the call-in procedure was too slow and inefficient	8.0	12.0	20.0	36.0	24.0
When speaking on the telephone to the instructor, there was very little "talk-back" noise or interference	7.7	34.6	34.6	11.5	11.5
Studying by satellite has been a meaningful learning experience for me	3.8	15.4	11.5	38.5	30.8